



CDC's Third National Report on Human Exposure to Environmental Chemicals

What the Report Is

- The *National Report on Human Exposure to Environmental Chemicals* provides an ongoing assessment of the U.S. population's exposure to environmental chemicals using biologic monitoring (biomonitoring). Biomonitoring is the direct assessment of people's exposure to chemicals by measuring the chemicals or their breakdown products (metabolites) in blood or urine.
- The Centers for Disease Control and Prevention (CDC) issued the *First National Report on Human Exposure to Environmental Chemicals* in March 2001. It presented exposure data for 27 chemicals from the 1999 National Health and Nutrition Examination Survey (NHANES 1999). The *Second Report*, released in January 2003, presented biomonitoring exposure data for 116 environmental chemicals (including the 27 in the *First Report*) for the noninstitutionalized, civilian U.S. population during 1999 and 2000.
- The *Third Report* provides information about 148 chemicals and is the most extensive assessment ever of exposure of the U.S. population to environmental chemicals. The Environmental Health Laboratory at the National Center for Environmental Health, CDC, conducted all measurements for the *Third Report*. The *Third Report* does not provide new health or toxicity information, state- or community-specific data, specific product- or environment-related information, or regulatory guidelines or recommendations.
- CDC uses NHANES to gather information about the health and nutritional status of the U.S. population. The information-gathering process includes health examinations, interviews, and laboratory tests. CDC asks people who take part in NHANES about their diet, exercise, and health habits and about their medical history. CDC also obtains blood and urine samples from these people.
- CDC scientists test the blood and urine samples to measure levels of different chemicals, such as metals like lead and pesticides like DDT. For the *Third Report*, CDC measured levels of 148 chemicals in people who took part in the survey.

What the Report Tells Us

- The survey results help CDC learn about the general population's exposure to certain chemicals. Sharing information about the results will benefit everyone—the public most of all—in numerous ways. For example, researchers can use the information to study the

association between levels of exposure and health outcomes. Health-care providers can use it to compare a particular patient's test results with results of the general population.

- The survey results also tell us whether efforts have succeeded to reduce the population's exposure to certain chemicals, such as lead or the chemicals in secondhand cigarette smoke.
- Detection of measurable amounts of these chemicals in people's bodies does not mean these people will become sick. More research is needed to show whether levels for the chemicals measured for the *Third Report* cause health problems.

Chemicals Covered in the *Report*

- The *Third Report* provides current exposure information for 148 chemicals, including information about the chemicals presented in the *Second Report* and first-time information about 38 additional chemicals.
- The 148 chemicals are grouped into the following categories: metals, cotinine, polycyclic aromatic hydrocarbons (PAHs), dioxins, furans and polychlorinated biphenyls (PCBs), phthalates, phytoestrogens, organochlorine pesticides, organophosphate pesticides, herbicides, pyrethroid insecticides, other pesticides, and carbamate insecticides.

Key Highlights and Findings

- **Continued progress in reducing blood lead levels in children**

New data on blood lead levels in children aged 1–5 years enable estimates of the number of children with elevated levels (that is, levels greater than or equal to 10 micrograms [µg] of lead per deciliter [dL] of blood). For the period 1999–2002, 1.6% of children aged 1–5 years had elevated blood lead levels. This percentage has decreased from 4.4% in the early 1990s.

These data document that public health efforts to reduce the number of children with elevated blood lead levels in the general population continue to be successful. However, other data show that special populations of children at high risk for lead exposure (for example, children living in homes containing lead-based paint or lead-contaminated dust) have higher rates of elevated blood lead levels and remain a major public health concern. Since no safe blood lead level in children has been identified, emphasis should be placed on efforts to control or eliminate lead in children's environment before children are exposed.

- **Exposure to Environmental Tobacco Smoke**

Cotinine is a metabolite of nicotine, and serum cotinine levels track exposure to environmental tobacco smoke (ETS) in people who do not smoke. Higher cotinine levels indicate more exposure to ETS, which is a human carcinogen (cancer-causing agent).

Serum cotinine data for the U.S. population are available for 1988–1991 from previous work at CDC, and with this *Third Report*, data are now available for 1999–2002.

From 1988–1991 to 1999–2002, median cotinine levels in nonsmokers decreased 68% for children, 69% for adolescents, and about 75% for adults. Levels of non-Hispanic blacks were more than twice those of Mexican Americans and non-Hispanic whites. Children's levels were more than twice those of adults. Efforts to reduce ETS exposure show significant progress, but ETS exposure remains a major public health concern.

■ **Exposure to Cadmium**

Recent research studies have shown that urine cadmium levels as low as 1 microgram [μg] per gram of creatinine in people may be associated with subtle kidney injury (that is, injury that may not be readily apparent) and increased risk for low bone mineral density. The *Third Report* shows that about 5% of the U.S. population aged 20 years and older had urinary cadmium levels at or near these levels. Cigarette smoking may be the source for these cadmium levels. These cadmium levels merit continued monitoring and should encourage further research on the public health consequences of these cadmium levels in people in this age group.

■ **Encouraging Findings About Exposure to the Organochlorine Pesticides Aldrin, Endrin, and Dieldrin**

These three pesticides are similar and were once widely used insecticides in agricultural applications, particularly for cotton and corn. Agricultural uses of aldrin and dieldrin were discontinued in the United States in 1970, and their use for termite control ended in 1987. Production and use of endrin was discontinued in 1986. However, these pesticides still are used in other countries. Although these pesticides are no longer used in the United States, they are still used in other countries. Results from the *Third Report* show undetectable or very low serum levels of each of these organochlorine pesticides.

■ **Better Data on Human Exposure to Dioxins and Related Compounds**

The *Third Report* provides data for 29 dioxins, furans, and dioxin-related polychlorinated biphenyls with generally lower limits of detection than previously possible. Results for three of these chemicals are presented for the first time in the *Third Report*. This new exposure information will substantively improve risk assessments currently in progress to determine health risk to the U.S. population from exposure to this family of chemicals.

■ **Mercury Exposure Among Women of Childbearing Age (16–49 years)**

Most of the mercury in blood comes from the consumption of fish or shellfish which accumulate methylmercury from water and soil. Mercury exposure is important to monitor in women of childbearing age because mercury can cause adverse neurodevelopmental effects in the developing fetus at blood levels potentially attainable through dietary sources. Data from the *Third Report* for 1999–2002 show that all women of childbearing age had levels below 58 micrograms per liter [$\mu\text{g/L}$], a concentration associated with neurodevelopmental effects in the fetus.

However, mercury levels in these women merit close monitoring because 5.7% of women of childbearing age had levels within a factor of 10 of those associated with

neurodevelopmental effects. Defining safe levels of mercury in blood continues to be an active research area.

■ **Improved Markers for Phthalate Exposure**

Phthalates are “plasticizers,” the name given to a group of chemicals that soften and increase the flexibility and resilience of plastics and vinyl. Exposure to these plasticizers is widespread. Newly identified markers better indicate exposure. Animal studies have demonstrated reproductive toxicity and other effects of phthalates. Currently, very limited scientific information is available on potential human health effects of phthalates at levels presented for the U.S. population in the *Report*.

■ **New Measures for Some of the Widely Used Pyrethroid Insecticides**

Pyrethroids are a group of synthetic insecticides that are now the most commonly used insecticides applied around the home. The *Third Report* presents first-time exposure information for five commonly used pyrethroid insecticides. The findings suggest widespread exposure to pyrethroid insecticides because 3-phenoxybenzoic acid, a common metabolite of several pyrethroid insecticides, was found in much of the U.S. population. Currently, very limited scientific information is available on potential human health effects of pyrethroid insecticides at levels presented for the U.S. population in the *Report*.

How People Can Get a Copy of the *Report*

To view CDC’s *Third National Report on Human Exposure to Environmental Chemicals*, go to CDC’s Web site at www.cdc.gov/exposurereport. You also can send an e-mail to ncehdls@cdc.gov and request a copy of the *Report*; call toll free at 1-866-670-6052; or write to the following address:

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